A Psychosocial Risk Factor–Targeted Intervention for the Prevention of Chronic Pain and Disability Following Whiplash Injury

Background and Purpose. The objective of this study was to determine whether the addition of a psychosocial intervention improved return-to-work rates beyond those associated with participation in a functional restoration physical therapy intervention. Subjects who had sustained whiplash injuries participated in the Progressive Goal Attainment Program (PGAP), which is a 10-week psychosocial intervention program that aims to increase activity involvement and minimize psychological barriers to rehabilitation progress. **Subjects and Methods.** A sample of 60 subjects enrolled in a functional restoration physical therapy intervention were used as a historical cohort comparison group. Subjects who received the functional restoration physical therapy intervention were compared with a sample of 70 subjects who received PGAP in addition to physical therapy. **Results.** Participation in PGAP plus physical therapy resulted in a higher return-to-work rate (75%) than participation in physical therapy alone (50%). Differences between treatment conditions were most pronounced for the subgroup of subjects who had the largest number of psychosocial risk factors. **Discussion and Conclusion.** The findings suggest that a psychosocial risk reduction intervention can be an effective means of improving function and facilitating return to work in people who are at risk for prolonged pain-related disability. [Sullivan MJL, Adams H, Rhodenizer T, Stanish WD. A psychosocial risk factor–targeted intervention for the prevention of chronic pain and disability following whiplash injury. *Phys Ther.* 2006;86:8–18.]

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otor vehicle accidents can expose the head and neck to sudden changes in velocity, resulting in whiplash injuries.[1] Although the majority of people who sustain whiplash injuries follow an uncomplicated course of recovery, for many people, the physical and emotional symptoms associated with whiplash injuries may persist for prolonged periods and contribute to significant disability.[2,3] Research suggests that chronic pain and pain-related disability develop in approximately 15% to 20% of people with whiplash injuries.[4–7]

Over the past decade, considerable research has addressed the importance of psychosocial factors as determinants of pain and disability associated with whiplash injuries.[8–11] Research findings suggest that affective variables, such as depression and anxiety,[8] or cognitive variables, such as pain catastrophizing,[9] are associated with heightened pain and disability in people who have sustained whiplash injuries. Recent reviews[12–14] indicate that psychosocial factors are significant risk factors for the development of prolonged pain and disability associated with a variety of pain-related conditions. Findings such as these have highlighted the need to develop intervention programs that specifically target the psychosocial variables that contribute to pain and disability.[15–18]

The Progressive Goal Attainment Program (PGAP) is a risk factor–targeted intervention program designed to be administered by rehabilitation professionals, such as physical therapists, occupational therapists, or occupational health nurses. The PGAP is a 10-week standardized psychosocial intervention program that aims to increase daily involvement in goal-directed activity and minimize psychosocial barriers to rehabilitation progress following musculoskeletal injury. The PGAP differs from most secondary prevention programs because of its primary focus on the reduction of psychosocial barriers to rehabilitation progress. The ultimate goal of the PGAP is to facilitate return to work.

The psychosocial risk factors targeted by the PGAP include pain catastrophizing,[19] fear of movement or reinjury,[17] and perceived disability.[20] The term "catastrophizing" is used to describe a particular response to pain symptoms that includes elements of rumination (ie, excessive focus on pain sensations), magnification (ie, exaggerating the threat value of pain sensations), and helplessness (ie, perceiving oneself as unable to cope with pain symptoms).[19] *Fear of pain* refers to a negative emotional reaction associated with pain that elicits a high degree of escape and avoidance behavior.[17] The term "perceived disability" refers to people's beliefs about the degree to which their condition interferes with their ability to participate in activities of daily living.[20] These variables have been shown to contribute to pain-related disability beyond the variance accounted for by medical status variables or pain itself.[16]

The purpose of this study was to assess the effectiveness of the PGAP in facilitating return to work for a sample of people who had sustained whiplash injuries in motor vehicle accidents. The treatment program was delivered by community-based rehabilitation professionals who had attended a 2-day training workshop. Return-to-work outcomes associated with participation in the PGAP were

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compared with outcomes for a sample of subjects who were matched with regard to diagnosis and psychosocial risk profile and who participated in a functional restoration physical therapy program. The comparison subjects were drawn from the same clinics as the participants in the PGAP but were recruited prior to the training of clinic staff in PGAP procedures. We predicted that participation in the PGAP would be associated with superior return-to-work outcomes than participation in the functional restoration program, particularly for subjects with more pronounced psychosocial risk profiles. We also predicted that participation in the PGAP would be associated with greater reductions in psychosocial risk factors than participation in the functional restoration program. Finally, the relationship between treatment-related changes in psychosocial risk factors and return-to-work outcomes was explored.

Method

Subjects

A sample of 70 subjects (32 women, 38 men) who had sustained whiplash injuries (grade I or II) (eg, pain-related limitations without neurological signs of injury or fracture)[4] participated in the PGAP. Participants were drawn from 5 rehabilitation clinics that were located in eastern Canada and whose staff had attended a 2-day training workshop on PGAP intervention techniques. The PGAP was offered in addition to a functional restoration physical therapy program typically offered to people with whiplash injuries (eg, emphasis on mobilization, flexibility, and endurance). The comparison group consisted of 60 subjects (32 women, 28 men) who had sustained whiplash (grade I or II) injuries, were matched for psychosocial risk profile (described in more detail later), and received only the physical therapy program. The comparison subjects were drawn from the same clinics as the subjects who received the PGAP but were recruited approximately 6 months prior to the training of clinic staff in the PGAP intervention. Subjects in the comparison group were participants in a study addressing the impact of physical therapy on psychosocial risk factors (Sullivan and colleagues, unpublished research). For the purposes of the present study, subjects were considered for participation only if they were employed prior to their motor vehicle accidents. Subjects provided informed consent prior to participation in the study.

Demographic, injury, and occupational characteristics of the sample are provided in Table 1. There were no group differences in age ($t_{128}=0.88$, not significant [NS]), sex distribution ($\chi^2_1=0.75$, NS), or duration of pain-related disability ($t_{128}=0.93$, NS). There were no group differences in the physical demands associated with preinjury employment ($\chi^2_2=0.63$, NS).

Table 1.
Demographic, Injury, and Occupational Characteristics of the Treatment Groups

Characteristic	Treatment Group[a]	
	Physical Therapy	PGAP+Physical Therapy
n	60	70
Sex (male:female)	28:32	38:32
Age (y), $\bar{X}$ (SD)	41.7 (8.3)	40.0 (8.1)
Education (y), $\bar{X}$ (SD)	11.7 (3.4)	12.2 (4.3)
Time off work (wk)	31.8 (17.4)	28.9 (18.3)
Injury (%)		
Neck only	70	65
Multiple sites	30	35
Occupational physical demands (%)		
Low	15	16
Medium	50	56
High	35	28
Duration of treatment (wk), $\bar{X}$ (SD)	9.8 (0.5)	9.8 (1.0)

[a] PGAP=Progressive Goal Attainment Program.

Table 2.
Means and Standard Deviations (in Parentheses) for Pretreatment Risk Factor Measures[a]

Measure	Treatment Group		
	Physical Therapy (n=60)	PGAP+Physical Therapy (n=70)	P
MPQ	35.6 (14.2)	31.2 (13.5)	.08
PCS	27.3 (11.5)	24.3 (11.2)	.13
TSK	41.8 (7.2)	42.0 (7.3)	.88
PDI	42.6 (13.8)	40.0 (11.5)	.26

[a] PGAP=Progressive Goal Attainment Program, MPQ=McGill Pain Questionnaire (Pain Rating Index), PCS=Pain Catastrophizing Scale, TSK=Tampa Scale for Kinesophobia, PDI=Pain Disability Index.

Pretreatment scores on measures of pain catastrophizing, fear of movement and reinjury, and perceived disability were comparable to those reported in previous research.[9,16,21,22] As shown in Table 2, there were no significant differences in pretreatment measures between the group receiving PGAP plus physical therapy (PGAP+physical therapy group) and the group receiving physical therapy alone (physical therapy alone group).

Procedure

The PGAP is a standardized, manual-driven intervention program that aims to maximize activity involvement in subjects with a debilitating pain condition. Clients meet individually with PGAP clinicians on a weekly basis for approximately 1 hour. In the first phase of the program, psychosocial obstacles to rehabilitation progress are tar-

geted indirectly through activity monitoring, activity prescription, and graded activity participation. In the second phase of the program, psychosocial obstacles to progress are targeted directly through techniques such as thought recording, reappraisal, and cognitive restructuring. The main components of PGAP are summarized in the Appendix. Standardized assessments of pain severity, pain catastrophizing, fear of movement or reinjury, and perceived disability are conducted before treatment, during treatment, and at treatment termination.

The PGAP clinicians for the present study were 6 physical therapists and 4 occupational therapists. The mean number of years of clinical experience for the physical therapists was 3.3, with a range of 2 to 6 years. The mean number of years of experience for the occupational therapists was 4.0, with a range of 2 to 8 years. Although there was no minimum number of years of experience required to enroll in the PGAP training workshop, some degree of experience likely is required to appreciate the nature of psychosocial challenges that may be encountered during rehabilitation.

All 6 physical therapists who treated clients in the physical therapy alone group also treated clients in the PGAP+physical therapy group. However, for a particular client in the PGAP+physical therapy group, a physical therapist could provide the functional restoration intervention or the PGAP, but not both. The 4 occupational therapists who treated clients in the PGAP+physical therapy group were employed in the same clinics that provided the functional restoration intervention but were involved only in the return-to-work component of the treatment of clients in the physical therapy alone group.

The PGAP is provided as a program complementary to traditional approaches to the management of musculoskeletal injury. Through the addition of the PGAP to existing medical and physical therapy interventions, the objective is to create virtual multidisciplinary teams at the community-based level. Subjects are considered candidates for the PGAP if they score within the risk range (ie, above the 50th percentile) on at least 1 of the psychosocial measures targeted by the program. Normative tables for the risk factors assessed in the PGAP are available at the PGAP Web site (www.pdp-pgap.com). All subjects in the PGAP+physical therapy group also were participating in a functional restoration physical therapy program.

Return-to-work outcomes for the PGAP+physical therapy group were compared with those for the historical cohort comparison group. The comparison group consisted of subjects who had participated in a functional restoration physical therapy program prior to clinic staff receiving training in the PGAP protocol. The functional restoration program consisted of 3 weekly visits of 2.5 hours. The functional restoration program was characterized by a sports medicine approach consisting primarily of joint manipulation, active-range-of-motion exercises, and strengthening exercises, progressively increasing in intensity. For the purposes of this study, subjects were considered part of the comparison group only if they met the same inclusion criteria as those in the PGAP+physical therapy group (ie, diagnosis of whiplash injuries, with at least 1 initial score on the psychosocial risk factor measures above the 50th percentile).

For both treatment groups, treatment was discontinued once a subject had returned to work. That is, the interventions were designed to run for a maximum of 10 weeks but could be terminated once return to work was achieved. Therefore, subjects who discontinued treatment prior to 10 weeks and returned to work were not considered treatment dropouts. For the purposes of this study, only subjects who discontinued treatment prior to 10 weeks and did not return to work were considered dropouts. On the basis of these criteria, only 1 subject in the physical therapy alone group dropped out of treatment. The data for this subject were retained for analyses with the last observation on dependent measures carried forward.

Measures

Catastrophizing. The Pain Catastrophizing Scale (PCS)[23] was used to assess catastrophic thinking in relation to pain. On this scale, respondents are asked to rate the frequency with which they experience 13 different thoughts and feelings related to pain. The PCS has been shown to have high internal consistency (coefficient alpha=.87)[23] and to be associated with heightened pain, self-reported disability, and employment status.[19] The 50th percentile cutoff score for participant selection was 20.

Fear of movement or reinjury. The Tampa Scale for Kinesophobia (TSK)[24] was used to assess fear of movement or reinjury. The TSK is a 17-item questionnaire that has been shown to have adequate to high internal consistency (coefficient alpha=.77)[21] and to be associated with measures of behavioral avoidance and self-reported disability.[25] The 50th percentile cutoff score for participant selection was 39.

Perceived disability. The Pain Disability Index (PDI)[26] was used to assess the degree to which respondents perceived themselves to be disabled in 7 different areas of daily living (home, social, recreational, occupational, sexual, self-care, and life support). The PDI has been shown to yield data that are reliable and is significantly

correlated with objective measures of disability.[22,27] The 50th percentile cutoff score for participant selection was 37.

Pain severity. The Pain Rating Index of the McGill Pain Questionnaire[28] was used to assess current pain severity. The Pain Rating Index is a weighted sum of all pain adjectives endorsed and is considered to be a reliable and valid measure of an individual's pain experience.[29]

Primary Outcome Variable

Return-to-work status was assessed by telephone interview 4 weeks following termination of the treatment program. Clients were asked the following questions: (1) Have you returned to full-time work? (2) If not, have you returned to part-time work? If so, how many hours per week? and (3) Have you returned to the same employment you had prior to your injury? The interviewer was an office assistant who was unaware of treatment condition and the hypotheses of the study. For the purposes of the present study, clients were classified as having returned to work if they had returned to full-time preinjury employment or alternate employment. All other clients were classified as not having returned to work.

Data Analysis

Chi-square analysis was used to assess treatment-related differences in return-to-work rates. Follow-up analyses addressed potential demographic, injury, and occupational influences on return to work. Multivariate analysis of covariance was used to examine treatment-related differences in changes in psychosocial risk factors between treatment initiation and treatment completion. Follow-up univariate analyses of covariance were used to evaluate treatment effects separately for pain catastrophizing, fear of movement or reinjury, and perceived disability.

Logistic regression was applied in hierarchical analyses to determine predictors of return to work. The significance of improvement in model fit with the addition of variables in the hierarchical analyses was obtained from chi-square comparisons, and the unique contribution of each variable was evaluated on the basis of the significance of the corresponding odds ratio (OR). The 95% confidence interval (CI) for each OR also was computed, and model fit for groups of variables was assessed with the value of –2 times the log likelihood. The Nagelkerke R^2, which ranges between 0 and 1, provided an index of the proportion of variability that was explained by the predictor variables in each analysis. Percentages of correct classification were determined for the probability threshold value of .5.

Results

Return-to-Work Outcomes

Four weeks following completion of the treatment program, significantly more participants in the PGAP+physical therapy group (75%) than in the physical therapy alone group (50%) had returned to work (χ^2_1=9.2, P<.01). Subjects who returned to work did not differ significantly in age (t_{128}=0.38, NS) or years of education (t_{128}=−0.29, NS) from those who did not return to work. Subjects who returned to work had been absent from work for a significantly shorter duration of time ($\overline{X}$=23.6 weeks, SD=12.4 weeks) than subjects who did not return to work ($\overline{X}$=42.0 weeks, SD=20.1 weeks) (t_{128}=6.4, P<.01). The probability of returning to work did not vary as a function of sex (χ^2_1=0.10, NS) or physical demands of occupation (χ^2_2=1.82, NS).

Return-to-work outcomes were compared between treatment groups as a function of initial psychosocial risk profiles. For these analyses, *risk factor profile* was defined in terms of the specific risk factor measures on which subjects scored above the 50th percentile. Return-to-work outcomes were compared between treatment groups for subjects who scored above the 50th percentile on measures of pain catastrophizing, fear of movement or reinjury, perceived disability, or all risk factor measures. Categories were not mutually exclusive; therefore, the sum of participants in each risk factor category exceeds the total sample size.

The Figure shows the differences in return-to-work rates for the 2 treatment groups as a function of different psychosocial risk profiles. For subjects who scored above the 50th percentile on measures of pain catastrophizing, fear of movement or reinjury, or perceived disability, participation in PGAP contributed to a 54% to 62% increase in the probability of returning to work. The most marked difference between the 2 groups was in the subgroup of subjects who scored above the 50th percentile on all psychosocial risk factors; for these subjects, the addition of PGAP was associated with a 128% increase in the probability of returning to work. Differences between treatment groups were significant at P<.05 for all comparisons.

Reductions in Psychosocial Risk Factors

Multivariate analysis of variance for repeated measures on risk factor scores (PCS, TSK, PDI, and McGill Pain Questionnaire) revealed a significant main effect for time (Wilks λ=.58, $F_{2,127}$=44.8, P<.001), a significant time × scale interaction (Wilks λ=.69, $F_{6,123}$=8.9, P<.001), and a significant group × scale interaction (Wilks λ=.92, $F_{3,126}$=3.4, P<.05). Follow-up analyses revealed significant reductions in all risk factor measures, although the magnitudes of the reductions varied
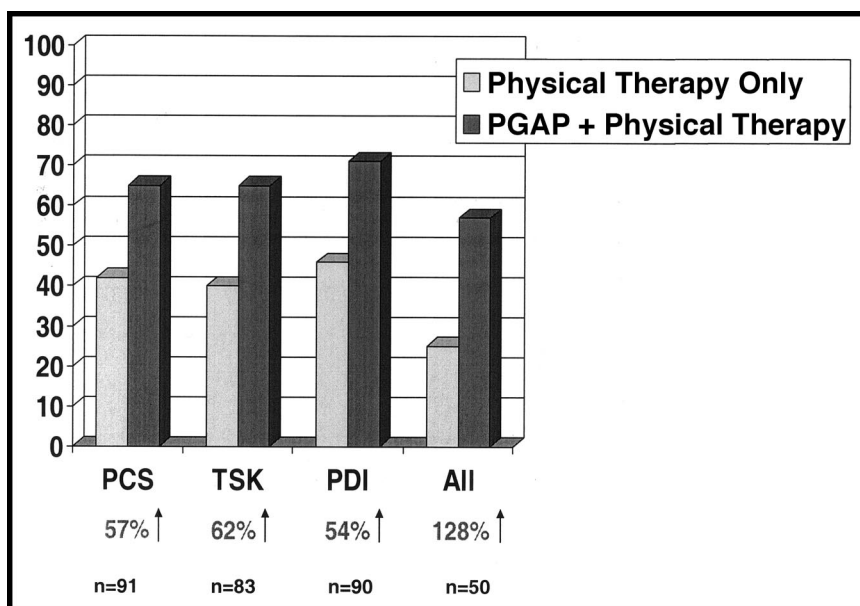
Figure.
Treatment effectiveness (percent return to work) as a function of the type and number of psychosocial risk factors. Values represent the percentages of subjects who initially scored above the 50th percentile on each of the risk factor measures and who returned to work. PGAP=Progressive Goal Attainment Program, PCS=Pain Catastrophizing Scale, TSK=Tampa Scale for Kinesophobia, PDI=Pain Disability Index, All=initial scores above the 50th percentile on all risk factor measures.

Table 3.
Adjusted Means and Standard Errors (in Parentheses) for Treatment-Related Changes in Psychosocial Risk Factor Scores[a]

| Measure | Treatment Group | | P |
	Physical Therapy (n=60)	PGAP+Physical Therapy (n=70)	
MPQ	1.9 (1.7)	2.7 (1.6)	.25
PCS	6.7 (1.1)	10.3 (1.1)	.05
TSK	4.3 (0.9)	4.7 (0.8)	.80
PDI	10.1 (1.8)	12.2 (1.6)	.41

[a] Change scores were computed by subtracting scores after treatment from those before treatment. Higher values represent a greater reduction in risk factor scores. For each analysis, pretreatment scores were used as covariates. MPQ=McGill Pain Questionnaire (Pain Rating Index), PCS=Pain Catastrophizing Scale, TSK=Tampa Scale for Kinesophobia, PDI=Pain Disability Index.

as a function of the specific risk factors. For both groups combined, pain catastrophizing showed the most marked reduction (33%), followed by perceived disability (24%), fear of movement or reinjury (10%), and pain severity (4%). Analyses of covariance were used to examine group differences in the magnitudes of treatment-related reductions in the various psychosocial risk factor scores. Dependent variables in these analyses were scores on psychosocial risk factor measures for changes between treatment initiation and treatment completion.

In order to control for initial values, pretreatment scores were used as co-variates. Adjusted means are presented in Table 3. Analyses of mean differences revealed that significant group differences emerged only for pain catastrophizing, for which the PGAP+ physical therapy group showed greated reductions than the physical therapy alone group ($F_{1,127}=5.0$, $P<.05$).

Treatment-Related Changes in Psychosocial Risk Factors as Predictors of Return to Work

Hierarchical logistic regression analyses were conducted to determine the variables that predicted return to work. All continuous variables were standardized to provide a common scale for interpreting the associated ORs. Age, sex, and duration of work absence were entered in the first block of the analysis and contributed significantly to the prediction of return to work ($R^2=.32$, $\chi^2_3=35.2$, $P<.001$). Change in the score for pain severity was entered in the second block of the analysis and contributed significantly to the prediction of return to work ($\chi^2_1=9.2$, $P<.01$). Changes in scores for pain catastrophizing, fear of movement or reinjury, and perceived disability were entered in the last block of the analysis. As shown in Table 4, changes in risk factor scores contributed significantly to the prediction of return to work, beyond the variance accounted for by age, sex, duration of work absence, and change in pain severity ($\chi^2_3=21.1$, $P<.001$).

Examination of the ORs for the final regression equation revealed that only a shorter duration of work absence (OR=0.24, 95% CI=0.22–1.5) and greater reductions in pain catastrophizing (OR=2.7, 95% CI=1.4–5.2) contributed significant unique variance to the prediction of return to work. The final regression equation correctly classified 83.8% of cases.

Discussion
The results of the present research join a growing body of literature suggesting that psychosocial interventions can play an important role in minimizing disability attributable to pain.[30–33] Analyses revealed that a risk factor–targeted intervention administered by physical therapists and occupational therapists can have a meaningful impact on return to work following whiplash injuries. The impact of PGAP was most pronounced for the subgroup of subjects who scored in the risk range on all psychosocial variables targeted by the program.

Table 4.
Summary of Hierarchical Logistic Regression Predicting Return to Work From Changes in Risk Factor Scores (N=130)[a]

Step	Variable Added at Each Step	Statistical Summary						% Correct Classification
		$\Delta\chi^2$	Δdf	R^2	$-2LL$	OR	95% CI	
1	Age	35.3[b]	3	0.32	134.8	1.09	0.65–1.8	75.4
	Sex					0.59	0.22–1.5	
	Duration of work absence					0.24[b]	0.12–0.49	
2	Ch-MPQ	9.2[c]	1	0.39	125.5	1.5	0.87–2.6	76.9
3	Ch-PCS	21.1[b]	3	0.54	104.4	2.7[d]	1.4–5.2	83.8
	Ch-TSK					1.0	0.59–1.82	
	Ch-PDI					1.6	0.86–3.1	

[a] Changes in scores between treatment initiation and treatment completion. Ch-MPQ=changes in McGill Pain Questionnaire scores, Ch-PCS=changes in Pain Catastrophizing Scale scores, Ch-TSK=changes in Tampa Scale for Kinesophobia scores, Ch-PDI=changes in Pain Disability Index scores, $-2LL=-2$ times the log likelihood, OR=odds ratio, CI=confidence interval. Odds ratios are from the final regression equation.
[b] $P<.001$.
[c] $P<.05$.
[d] $P<.01$.

Participation in the physical therapy alone group was associated with a 50% return-to-work rate. Return-to-work rates of this magnitude would be in the range of expected outcomes at 6 months after injury for a sample of subjects participating in a rehabilitation intervention.[4,6–8] Participation in the PGAP+physical therapy group was associated with a 75% return-to-work rate. When examined in relation to subjects scoring in the risk range (50th percentile) on specific risk factor measures, participation in the PGAP+physical therapy group was found to be associated with a 54% to 62% increase in the probability of returning to work. The most marked benefit of participation in the PGAP+physical therapy group was for the subgroup of subjects who scored in the risk range on all 3 psychosocial risk factor measures. For these subjects, participation in the PGAP+physical therapy group was associated with a 57% return-to-work rate, compared with 25% for the physical therapy alone group. These data suggest that people who have severe psychosocial risk profiles are particularly resistant to treatment and that the probability of return to work can be significantly augmented by the addition of a psychosocial risk factor–targeted intervention.

For the various risk factors targeted, the results suggest that PGAP affected primarily the levels of catastrophic thinking. Numerous investigations[16,34–36] have highlighted the important role of pain catastrophizing as a determinant of pain and disability and have emphasized the need to specifically target catastrophic thinking to achieve a positive rehabilitation outcome. People with high scores on measures of pain catastrophizing report more intense pain, display more pain behavior, consume more pain medication, and remain off work for longer periods of time following musculoskeletal injury.[9,13,19] Several components of PGAP were designed to effect reductions in pain catastrophizing. These components include education and reassurance, collaborative activity planning, activity prescription, thought monitoring, reappraisal, and cognitive restructuring. These program components may have contributed to the more pronounced reductions in catastrophic thinking observed in the PGAP+physical therapy group than in the physical therapy alone group.

Both treatment conditions were associated with moderate decreases in perceived disability. It is possible that levels of perceived disability decrease when clients observe themselves achieving goals that they had previously considered beyond their reach. In PGAP, this objective is achieved through incremental increases in activity demands and feedback to clients about the gains that have been made in treatment. These same features may be present in functional rehabilitation approaches in physical therapy, in which clients are encouraged to progressively increase their physical abilities and endurance. As clients become aware of the gains that they have made, their beliefs in their levels of disability may be challenged.

Graded activity involvement, progressive goal setting, and task decomposition strategies were intended as the primary tools to effect reductions in fear of movement or reinjury. Despite program techniques aimed at reducing fear of movement or reinjury, only a modest reduction was obtained in the PGAP+physical therapy group; this reduction was not significantly different from the reduction observed in the physical therapy alone group. It is possible that a more focused approach to fear reduction is required to decrease levels of fear of movement or reinjury, perhaps one involving direct exposure to feared activities.[30,33]

Reductions in pain severity were not anticipated as a function of participation in PGAP. The intervention tools of PGAP are aimed at increasing activity involve-

ment and reducing disability, not decreasing pain. Indeed, initial increases in activity involvement are more likely to be associated with increases as opposed to decreases in pain. It is noteworthy that in both treatment conditions, return-to-work outcomes were achieved despite only modest decreases in levels of pain. Pain reduction may not be an essential component of successful rehabilitation.[15]

It is interesting that although PGAP was designed specifically to target psychosocial risk factors for prolonged disability, superior reductions in psychosocial risk factors were obtained only for pain catastrophizing. That is, the functional restoration physical therapy program yielded comparable decreases in perceived disability and fear of movement or reinjury. These results suggest that traditional physical therapy interventions are able to yield significant reductions in psychosocial risk factors. Changes in psychosocial risk factors through physical therapy may emerge secondary to improvements in physical function or may be the direct result of interpersonal processes that exist in the physical therapist-client relationship. More research is needed to systematically address which psychosocial risk factors are reduced through traditional physical therapy interventions and which are not. Such research may provide useful insights into how physical therapy interventions may be modified to augment their impact on psychosocial risk factors.

Psychosocial interventions for pain and disability traditionally have been administered by mental health professionals.[16] Although the services of mental health professionals are indispensable in the management of complex problems of disability, such services tend to be solicited only once chronicity has been established. Referral agents are often reluctant to refer clients for psychological services in the early stages of recovery from injury. The stigma associated with mental health services has had a negative impact on the inclusion of psychological services in secondary prevention programs. The preliminary findings from PGAP suggest that it is possible to train rehabilitation professionals in the skills necessary to effectively manage psychosocial barriers to rehabilitation progress. It is important to note that the psychosocial risk factors targeted by PGAP are not mental health disorders and as such do not require intervention by mental health professionals. When there is evidence of clinically significant psychosocial risk factors, such as depression or anxiety, intervention by mental health professionals likely will be required.

The risk factors targeted by the PGAP, namely, pain catastrophizing, fear of movement or reinjury, and perceived disability, represent but a subset of psychosocial variables shown to contribute to prolonged pain-related disability.[13,14,37] These variables were chosen as targets of the PGAP on the basis of the availability of sound measurement instruments and their amenability to change through intervention. Several important psychosocial risk factors, such as age, sex, education, and job satisfaction, cannot be modified readily within the context of rehabilitation intervention. The distinction between modifiable and nonmodifiable risk factors is paramount to the development of effective screening and intervention programs aimed at facilitating recovery following debilitating injury.

The development of the PGAP proceeded from the view that successful disability prevention would entail the reestablishment of a structured activity schedule and the reduction of psychological barriers to activity.[38] The development of the PGAP also proceeded from the view that a viable secondary prevention program would need to embrace a population health philosophy, allowing for timely access to service by the entire population of people who require the service.[39,40] To achieve this end, a community-based model of service delivery was adopted. The use of community-based resources for service delivery, particularly in rural regions, maximizes the accessibility of service and minimizes the inconvenience to the client participating in treatment.[39] To date, several hundred front-line rehabilitation professionals have been trained to be PGAP providers, thus ensuring the availability of the service in many regions of Canada and the United States.

A community-based approach to secondary prevention has a higher probability of being sustainable within the budgetary constraints of health care systems and third-party payers. Although multidisciplinary treatment centers have been discussed as the treatment of choice for people with persistent pain disability, these centers are typically situated in large cities, not readily accessible to people living in outlying or rural regions. Furthermore, the cost associated with treatment in multidisciplinary centers is often beyond the means of many third-party payers. Through the establishment of "virtual" multidisciplinary teams at the community-based level, the PGAP holds the promise of making available the essential ingredients of multidisciplinary treatment to people who otherwise would not have access to such services.

One limitation of this study is that a method of objectively assessing adherence to the treatment protocol was not included. Training clinicians to deliver a structured intervention does not ensure that the intervention will be delivered with complete fidelity by all clinicians providing the service. The PGAP training workshops do not include examination for the purposes of certification; therefore, there is no assurance that all clinicians emerge from training with the same level of skill. A number of strategies were used to maximize fidelity to

the treatment protocol. First, the PGAP Treatment Manual* provides a detailed description of all intervention strategies used in the program, as well as guidelines for the sequence of their implementation. Second, all clients viewed the PGAP Information Video, which describes the goals and procedures of the intervention program. The videotape also is used as a vehicle for providing important medical and rehabilitation information that is difficult to communicate effectively within the time constraints of typical physician visits. The videotape format is more engaging than text-based information and ensures that the same medical and rehabilitation information is provided to all clients. Finally, clients were provided with a copy of the PGAP Client Workbook. The daily recording format of the Client Workbook is sufficiently structured to maintain consistency in treatment direction but sufficiently open to accommodate various paces of treatment progression. Although the PGAP Client Workbook was not intended as a self-help book, it contains detailed information on the basics of activity planning, structured scheduling, and strategies for overcoming barriers to activity involvement. The PGAP Client Workbook also provides the client with a summary of the central themes of the treatment sessions.

Some degree of caution must be brought to bear in the interpretation of the present findings. Clients were not randomly assigned to treatment conditions; therefore, differences between groups cannot be unambiguously attributed to participation in the PGAP. Although a randomized clinical trial is the ideal design for ascertaining treatment effect, legal and policy constraints presented obstacles to the use of such a design. All clients in the present study were receiving indemnity benefits and were involved in litigation. Difficulties in securing legal consent for participation in an experimental treatment study led to the adoption of the sequential group approach used in the present study. The choice of return to work as the primary outcome variable also presents interpretive difficulties, as does the absence of an objective ascertainment of return-to-work status. People may or may not return to work as a function of factors that may be completely unrelated to functional ability. The absence of follow-up also precludes any conclusions about work retention and the maintenance of treatment gains.

It is also important to emphasize that psychosocial factors are but one domain of barriers to successful reintegration into the workplace. It is becoming clearer that successful interventions for achieving sustainable return to work following injury must address workplace factors as well as risk factors that exist within an individual.[41] Factors such as the availability of modified work can play a significant role in maximizing the success of return-to-work interventions.[41] In the present study, return to work was a primary objective of treatment, whether clients were in the physical therapy group or the PGAP+physical therapy group. However, detailed information on the availability of modified work options was not available; therefore, such options could not be compared between treatment groups. The combined effects of interventions targeting psychosocial risk factors and workplace barriers remain a topic for future research.

Finally, clients in the PGAP+physical therapy group received 10 hours of intervention beyond what those in the physical therapy alone group received. Therefore, the possibility that the superior treatment outcomes associated with participation in the PGAP may have been attributable to the increased number of intervention hours cannot be ruled out. Confidence in the conclusions drawn about the potential advantages of the PGAP must await replication within a randomized clinical trial.

Conclusion
Our preliminary findings suggest that a psychosocial risk factor–targeted intervention in combination with physical therapy can lead to significant increases in the probability of return to work following whiplash injuries. The findings further suggest that front-line rehabilitation professionals can develop the skills necessary to effect significant reductions in psychosocial risk factors for prolonged pain and disability. The addition of the PGAP had its most pronounced impact (compared with physical therapy alone) on the subgroup of subjects who scored in the risk range on all 3 psychosocial risk factor measures. The combination of psychosocial intervention with physical therapy may emerge as a viable and cost-effective approach for the prevention of prolonged pain and disability following musculoskeletal injury.

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* PGAP treatment materials can be ordered through the PGAP Web site (www.pdp-pgap.com).

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Appendix.
Main Components of the Progressive Goal Attainment Program
(PGAP)

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1. Education and Reassurance
The PGAP Information Video is used to provide the client with education about the nature of soft-tissue injuries. Interviews with medical experts depicted in the PGAP videotape are intended to convey reassurance about the benign nature of pain symptoms and the importance of maintaining involvement in physical activities during the course of recovery.

2. Maintaining an Activity Log
Because one of the goals of PGAP is to maximize activity involvement, the client is asked to complete the activity log in the PGAP Client Workbook throughout the course of treatment.

3. Activity Scheduling
Working with the PGAP clinician, the client develops an activity schedule that is designed to keep him or her as active as possible during the recovery period. The activities may include household activities, running errands, and social and recreational activities.

4. Walking Program
A main component of the PGAP is the development of a walking program. The walking program starts with one 15-minute walk each day. As the PGAP moves forward, the clinician works with the client to steadily increase the distance walked each day.

5. Increasing Activity Involvement
Throughout the course of treatment, the PGAP clinician assists the client in ways to increase activity involvement. The client is taught principles of graded activity participation to maintain the momentum of recovery while minimizing the risk of pain flare-ups. It is through graded activity participation that the client is first introduced to psychosocial strategies that can assist in overcoming the challenges of pain and pain-related disability.

6. Overcoming Psychological Obstacles to Activity Involvement
In the second phase of the program, the client develops skills to overcome fears of reinjury, learns to monitor and modify catastrophic thinking that may accompany pain, and learns to challenge his or her perceived limitations. Different intervention modules are invoked to target specific psychosocial risk factors. The choice of modules is determined by the client's scores in the risk factor assessment conducted midway through the program. Finally, the client learns communication skills and problem-solving strategies that will assist him or her in meeting the challenges brought on by occupational injury.